Capstone Project Proposal

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Project Proposal

Company A is an ultrasonic breast imaging company that utilizes ultrasound to provide 3D breast imaging. The goal is to allow an alternative for women that have an abnormal mammography reading, without needing to go through another painful mammography or expose themselves to radiation through an MRI. The scanner is controlled by a monitor that hooks directly into the scanner. The user interface provides the operator controls to move the rod position, fill the scan tank, view exam information, and run scans.

The goal of this project is to develop a web-based user interface that will allow the operator to control the scanner online, using a mobile or desktop device to control the scanner. The project will be completed according to the specification of the project manager, in accordance with any regulations that must be followed to allow for confidential access to patient info.

Project Scope

The breast scanner is a real-time system, and the user interface is screen based. The operator of the system should be able to check patient exam info, fill the scan tank, run a patient scan, add a patient scan, run the scan, reprocess exam images based on breast tissue density, and independently control the scanner retention rod and scan tank. Scan images are stored as DICOM files and are stored in a database. Security is a very important step in this project, as patient information MUST remain confidential. As of now, the plan is to implement an authorization key that will only allow a user to the interface if they have logged in prior to accessing the scanner interface.

Project Completion

The project will be considered completed successfully based on multiple factors.

1. The project must be reviewed and accepted by the project manager according to their specifications.
2. The project must contain security implementation that meets HIPAA privacy and security rules.
3. The project is developed within the appropriate time frame.

Project Controls

Some risks of this project include:

1. Communication between the brokers is disrupted.
   1. To negate this risk, multiple attempts to reconnect should be tried. If a connection still cannot be established, the scanner should be restarted
2. A hacker tries to access the web server remotely to gain access to patient information
   1. To prevent this, we must implement a very strict security wall. An option is to only allow certain IP addresses to access the interface.

Meetings will be held between the project manager, the senior software developer, and me to discuss both progress and the prototype that is under development.

Project Schedule

There are three options for developing the web interface:

1. Use node.js C++ addons to compile the C++ code, allowing a node.js addon that can call the scanner functions directly.
2. Create a server on the scanner that will transmit information to the web server and vice versa.
3. Utilize a messaging service to transmit data from the scanner to an internal web server located within the scanner. Each node will have a broker that will communicate with a central broker to handle all data and send to the front-end.

The preferred method would be the third, as it allows for a simplified messaging service between the front and backend and decouples both ends of the application. It also allows us to build the frontend with a specific framework, such as React or Angular.

Meetings will be held weekly between the project manager, senior developer, and me.

The following are rough estimates of the tasks that need to be accomplished:

1. Requirements Analysis – 20 hours
2. Design front end of application – 50 hours
3. Design server-side logic – 80 hours
4. Implement security features – 5-10 hours
5. Development of test protocols to ensure application is secure and stable – 15 hours
6. Test Implementation on first version release - 5 hours

Issue Log

Issues will be listed here.